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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,156	08/04/2003	Robert J. Howard	FE-00636	5451
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Lockheed Martin Corporation Intellectual Property Law Department Bldg. 400, Mail Drop 043 9500 Godwin Drive Manassas, VA 20110			EXAMINER WYSZOMIERSKI, GEORGE P	
			ART UNIT	PAPER NUMBER
			1742	
DATE MAILED: 04/10/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/633,156

Applicant(s)

HOWARD, ROBERT J.

Examiner

George P. Wyszomierski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 33-62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 33-45 and 47-62 is/are rejected.
- 7) ☒ Claim(s) 46 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

1. Claim 59 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The meaning of "loss of heat" in this claim is uncertain. In any chemical reaction, the total heat applied and generated during the reaction will either be consumed in the reaction itself or lost to the surrounding environment, i.e. heat cannot be created or destroyed but can only be changed into a different form of energy. Clarification is required as to what this "loss of heat" signifies in the claimed process.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 34, 35, 39, 44, 45, 53, 55, 56 and 61 are rejected under 35 U.S.C. 102(b) as being anticipated by Negishi (U.S. Patent 6,165,633).

Negishi Figure 7 depicts a shape memory metal **83** adjacent a catalyst **23b**. A fuel-air mixture **79** contacts this structure. With respect to claim 39, the Negishi Abstract states that heat required for the prior art reaction can be supplied by the oxidation reaction of methanol. With respect to claim 44, the catalyst may contain copper. With respect to claim 45, the raw fuel in Negishi is methanol (an alcohol vapor) and is mixed with air (which contains oxygen). With

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respect to claims 55, 56 and 61, the means by which the fuel and air would contact the memory metal in Negishi would fall within the definition of the terms "flow" and "apply" as recited in the instant claims. Thus, the Negishi disclosure is held to fully meet all of the limitations of the instant claims.

4. Claims 34, 35, 38, 40, 53-56, 61 and 62 are rejected under 35 U.S.C. 102(e) as being anticipated by Okamoto (U.S. patent 6,696,185).

Okamoto column 14, lines 64-68 discloses a shape memory metal acted upon by a catalyst in the presence of heat (which is taken to be the "reaction initiator" of instant claims 38 and 54). A mixture of fuel gas and air passes through this structure (see Okamoto column 6, lines 20-32) in accord with instant claims 35, 53, 55, 56 and 61. With respect to claim 40, the shape-memory alloys preferably used include, for example, nickel-titanium alloys; see Okamoto column 9, lines 4-8. With respect to claim 62, Okamoto discloses an end to the prior art process in accord with the instant claim. Thus, all aspects of the claimed invention are held to be fully disclosed by Okamoto.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 36, 37 and 47-50 and 52 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Negishi.

Claims 36, 37, and 47-51 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Okamoto.

Neither Negishi nor Okamoto, discussed supra, specify what surface(s) of the memory metal or catalyst are contacted by the mixtures of fuel and air in their respective references. The examiner's position is that the fuel and air in the prior art are in the gaseous state and therefore would inherently contact all surfaces in their vicinity absent some physical barrier preventing such contact.

At a minimum, one of ordinary skill in the art would want to construct the prior art systems to maximize efficiency, i.e. so that as much gas as possible comes into contact with the catalyst. Therefore, at a minimum, the disclosures of Negishi or Okamoto are held to establish a prima facie case of obviousness of the presently claimed invention.

7. Claims 38, 40-43, 51, 54, 57-60, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negishi.

Negishi, discussed in item no. 3 supra, does not specify certain aspects of the invention as presently claimed. However, the claims do not patentably define over the disclosure of Negishi because:

a) With respect to instant claims 38, 51 and 54, while Negishi does not specify a "reaction initiator", the material coming from the evaporator **24** in Negishi can be considered to be a reaction initiator within the meaning of the claims.

b) With respect to claims 40-43, while Negishi does not specify the composition of the memory metal, it would be assumed by one of skill in the art that common memory metals such as Nitinol would function in the manner as discussed in the reference. Further, the memory

material in Negishi is required to be flexible, and thus would be processible into any of the generic shapes as recited in the instant claims.

c) With respect to claims 57-59, while this is not preferred by Negishi, one could clearly manipulate the amount or concentration of fuel in the Negishi process relative to the amount of catalyst so that the reaction is not self sustaining and would require heat in order to sustain the reaction.

d) With respect to claim 60, Negishi does not specify temperature of reaction. However, the reaction temperature would be a natural consequence of the fuel-air mixture used, and would include temperatures at or near the transition temperature of the memory material used in the prior art.

e) With respect to claim 62, clearly the reaction which occurs in Negishi would cease when the supply of fuel is exhausted.

Thus, the disclosure of Negishi is held to create a prima facie case of obviousness of the presently claimed invention.

8. Claims 39, 41-45, 52, and 57-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto.

Okamoto, discussed in item no. 4 supra, does not specify some of the limitations as defined in the instant claims. However, the claimed invention is not patentably distinct from Okamoto because:

a) With respect to claims 39 and 52, column 14 of Okamoto discloses raising the temperature of the shape memory alloy in order to operate the fuel cell of the prior art, thus at least suggesting the claimed limitations.

b) With respect to claims 41-43, the memory material in Okamoto is stated to be deformable. It is a reasonable assumption that this material would be easily deformable into any of the generic shapes recited in the instant claims.

c) With respect to claim 44, the catalyst materials in Okamoto are anode and cathode electrode catalyst layers. Thus, to use a material commonly used for catalyst electrodes, such as the materials as recited in the instant claim, would be within the purview of Okamoto.

d) With respect to claim 45, Okamoto does not identify any of the specific combinations as presently claimed. However, Okamoto column 6, line 7 indicates that one embodiment of the prior art is a methanol (alcohol vapor)/air (oxygen-containing gas) fuel cell. Thus, the limitations as presently claimed are at least suggested by Okamoto.

e) With respect to claims 57-59, one could clearly manipulate the amount or concentration of fuel in the Okamoto process relative to the amount of catalyst so that the reaction is not self sustaining and would require heat in order to sustain the reaction.

f) With respect to claim 60, Okamoto does not specify temperature of reaction. However, the reaction temperature would be a natural consequence of the fuel-air mixture used, and would include temperatures at or near the transition temperature of the memory material used in the prior art.

Thus, a prima facie case of obviousness is established between the disclosure of Okamoto and the presently claimed invention.

9. In a response filed February 2, 2006, Applicant has presented a completely new set of claims which overcomes all previous rejections based on the Fujiwara and/or Hirsch patents. However, the claims remain rejected for reasons as set forth herein.


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10. Claim 46 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art does not disclose or suggest a structure as claimed and including a monopropellant fuel-oxidizer mixture.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Wyszomierski whose telephone number is (571) 272-1252. The examiner can normally be reached on Monday thru Friday from 8:00 a.m. to 4:30 p.m. Eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on (571) 272-1244. All patent application related correspondence transmitted by facsimile must be directed to the new central facsimile number, (571)-273-8300. This new Central FAX Number is the result of relocating the Central FAX server to the Office's Alexandria, Virginia campus.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
GEORGE WYSZOMIERSKI  
PRIMARY EXAMINER  
GROUP 1700

GPW  
April 6, 2006